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The Constitutional Implications of a Cloning Society

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THE CONSTITUTIONAL IMPLICATIONS OF A CLONING SOCIETY

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It's a delight to be here today. I haven't been in Birmingham for at least fifteen years, and it is as beautiful as I remember. I want to thank the Cumberland School of Law for hosting this important symposium on bioethics. I have been told that it will be the first in a series of annual symposia focused on bioethics sponsored by the Cumberland Law Review and the Southern Center for Law and Ethics.

Recent scientific advances—most notably cloning, parthenogenesis, and stem cell research-have made it imperative that we, as lawyers, give serious thought not just to the ethical implications of these scientific advances, but also to the legal implications. That's what I want to talk to you about today: the significant legal - particularly constitutional—implications of human cloning. I'll be focusing specifically on reproductive cloning as opposed to therapeutic cloning — that is, the use of cloning technology to produce a baby.

Although previous speakers did a good job of laying out the basic science involved in nuclear transfer cloning, I'd like to go over the science briefly again because I think it's imperative that we understand the science in order to understand the implications of this technology. The process that created Dolly the sheep is commonly referred to as nuclear transfer cloning, or "NT." There is another, older type of cloning that has been around for years, called embryo splitting. Embryo splitting is just what it sounds like: the splitting of the cells in a developing embryo to create multiple embryos with the same genetic composition. In order to clone by embryo splitting, you literally take the developing cells in an embryo and split them apart. The cells that are split apart then continue dividing, with the result that identical twins, triplets, or other multiples are ultimately born. Cloning by embryo splitting has been successfully performed since the 1950s, with the earliest experiments being done on frogs. And cloning human beings was accomplished using embryo splitting back in 1993 by

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scientists at George Washington University.

The reason that cloning using embryo splitting was not as big a news item as the NT cloning that created Dolly is that, when you create a clone by embryo splitting, you don't know what you're "getting," so to speak. That's because the embryo being split is an embryo created by the unification of sperm and egg— a new life that is the unique combination of the genes of the mother and father. Because this embryo has not yet been born and raised, it is an unknown entity. You don't know if the embryo being split will turn out to be smart or dull, tall or short, healthy or sickly. So if you wanted to use embryo splitting cloning to create several cows, you'd have no idea whether the cow you cloned would turn out to be a cow you'd want to have more than one of.

Cloning by nuclear transfer, on the other hand, allows you to clone a known entity. By definition, when you use nuclear transfer technology, you are using a cell from an adult to reproduce the adult. Specifically, you would first take a donor egg and remove its nucleus. This is the process known as enucleation. You literally take the donor egg and suck the nucleus out using a pipette. Then you would take a cell from an adult (in the case of Dolly, it was a mammary cell from an adult female ewe—hence, the name Dolly) and inject this adult cell back into the enucleated egg. This is the process known as re-nucleation.

Once the egg has been re-nucleated with the adult donor's cell, a process known as fusion must occur. Literally, this means that the egg and the donor cell have to be fused together, using a stream of electricity generated by a fusion chamber. The electricity from the fusion chamber provides the spark of life; once the egg and adult donor cell have been fused together, the donor cell in the egg begins dividing, as though it had been fertilized with sperm. Once the developing embryo has divided into the blastocyst stage (a hollow ball of approximately 100 cells), the embryo is ready to be implanted into a womb, or surrogate mom.

Dolly the sheep was created this way. She's about five and a half years old now and appears to be quite healthy and normal. She has a touch of arthritis, but this is not unusual for a sheep her age. She has even given birth to her own lambs—about six of them, I believe, all of which are also very normal. There has been a report that Dolly's telomeres are slightly shorter than they should be for a sheep her age. Telomeres, you may recall, are located on the ends of our chromosomes.

They are believed to provide a rough indication of age. The longer the telomeres, the younger the animal (or person). The shorter the telomeres, the older. So Dolly's telomeres are slightly shorter than you would expect, but not significantly so. And there's no indication that her shortened telomeres are an inevitable part of the result of the cloning process. The cattle that have been cloned using NT, for example, appear to have longer than expected telomeres. So the premature aging thesis—that offspring of NT cloning will inherit the same age as that of the adult cell donor—does not appear to pan out.

One thing to keep in mind here is that, with the NT transfer process (or embryo splitting, for that matter), there are no instant adults. The process is merely another way to create a baby, who must then be carried to term by a female, nurtured and raised, just like any other baby. The key difference, of course, is that, with NT cloning, the male of the species is no longer a necessary component in reproduction. I can see the men in the audience starting to squirm. Just think how we women would feel if someone told us that there was a new way to reproduce that did not require women! I think we'd be a little nervous and insecure, too. And theoretically, that day may ultimately come. There is currently research underway to develop artificial wombs, where you would literally grow the baby in a giant plexi-glass tube, just like the science fiction movies. But that technology is in its incipiency, and is a very long way off. For now, any known type of reproduction (including cloning) requires a female womb in which to gestate the baby.

NT cloning has been successfully accomplished with several species: goats, mice, pigs, cattle, and most recently, cats. The cattle cloning business has proved particularly successful. You can see the picture there of a cow with the caption that reads, "Once a Dream. Now a Reality. We can now clone your cattle." This is from the Advanced Cell Technology web page. Their subsidiary, Cyagra, will clone a cow for $20,000, and $5,000 for each additional healthy clone you want produced. You can go to their web page and see pictures of many different kinds of cows they have cloned. They have even used NT cloning to reproduce a female longhorn who has the longest horns ever known to exist on a female longhorn. The baby is due sometime soon. The cat that was cloned recently—I think it was born in November 2001, although the announcement wasn't made public until just a few weeks ago, in February 2002—is named "Cc," for carbon copy, or copycat.

It is a female calico, just like the female calico that donated the adult cell.

The hope is that, one day soon, NT transfer cloning will be available to reproduce a beloved dead pet. Of course, the new pet would not really be an exact genetic duplicate of the dead pet. It would inherit mitochondrial DNA from the female who donated the originally enucleated egg. But, for the most part, it would be a genetic duplicate, just not one hundred percent. And, of course, it would grow up in a very different time and have different life experiences. So its environment would likely produce a pet with a different personality. After all, if you cloned yourself, the resulting child would look a great deal like you, but would not share your life experiences and may not end up sharing your interests or talents. Its life experiences would even alter its appearance from yours: it would likely have a different hair style or color, and it may have more or fewer wrinkles than you. Just take a close look at some of your friends who are identical twins. They share the same exact DNA (even their mitochondrial DNA is the same, which will not be true for cloning), yet there are subtle differences in facial features and the like.

And by the way, the rhesus monkey that you may have heard media reports about was not cloned using NT. It was cloned using the embryo splitting technique I talked about earlier. So there have not yet been any successful cloning attempts on higher primates.

NT transfer technology holds great promise, not just for helping infertile couples have a biologically related child or reproducing a near-copy of a beloved dead pet, but also for possibly reviving endangered species or even bringing back extinct ones. In January 2001, ACT successfully cloned a guar which, as you can see, is an ox-like creature. It's endangered and there are only 36,000 of them remaining. The remarkable thing about the cloning of the guar was that they used what's known as "inter-species" NT cloning. This is where you take an egg from one species, enucleate it, and renucleate it with an adult donor cell from another species. So with the guar, they enucleated an egg from an ordinary cow, renucleated it with the cell from an adult guar, fused the two together, and implanted the resulting embryo in the womb of a surrogate cow mom. The pregnant cow carried the guar to term. The baby guar, Noah, was born after a normal gestational period and appears to be normal in all respects.

ACT also has plans to use inter-species cloning to clone a

cheetah, using the enucleated egg of another species of large cat. There are also talks underway to use inter-species NT cloning to clone the endangered giant panda. Chinese scientists have already announced that they have successfully fused muscle, uterus and mammary cells from adult pandas with enucleated eggs from rabbits. But, needless to say, the rabbit is too small to serve as the surrogate mom. So the likely egg donor and surrogate mom will be another species of bear, most likely the American black bear.

When it comes to using inter-species NT to bring back extinct species, such as the dinosaur or woolly mammoth, there is a larger problem. First of all, there is not very much preserved tissue or cells from these extinct animals with which to work. And when tissue does exist, the DNA from the tissue is always damaged. It has big genetic gaps in it that are, at present, impossible to fill. You may have heard about the well-preserved woolly mammoth that was found a couple of years ago in the Arctic. Even though it was remarkably well-preserved (given its age), the DNA has proven to be full of holes. So it could not be used to bring the woolly mammoth back to life. Same thing goes with the Tasmanian tiger that you see there. It became extinct in the 1930s, but there is a pup that has been preserved in alcohol since 1866. But again, the DNA is so badly damaged that successful NT cloning is unlikely.

You can also see there a picture of the last remaining burcado, which is a type of mountain goat native to Spain. It's a female, and this picture was taken of her in 1999. Shortly after the picture was taken, a tree fell on her and she died. Now there are no more burcados on earth. Fortunately, the scientists back in 1999 preserved some of her cells and ACT now has plans underway to use inter-species NT cloning to bring the burcado back. They'll likely use another species of goat to serve as the egg donor and surrogate mom. Of course, without cells from a male burcado, they can never bring male burcados back to life.

Of course the six million-dollar question still remains: can NT transfer cloning be successfully used on humans? The answer is clearly "yes." In fact, it's already been done. In November 2001, ACT published a paper in which it announced that it had used NT to create three human embryos. Specifically, they re-nucleated and fused nineteen human donor eggs. Eleven of the nineteen were re-nucleated with skin cells scraped from human donors. The other eight were re-nucleated with cumulus cells from human donors. Of the

nineteen eggs re-nucleated with skin cells, none began dividing after fusion. But of the eight eggs re-nucleated with cumulus cells, three began dividing after fusion, creating human embryos. One survived to the two-cell stage, one survived to the four-cell stage, and one survived to the six-cell stage before dying naturally. Critics of the ACT experiments say that the experiments are insignificant because none of the human embryos survived to the blastocyst stage. As you recall, it's only when an embryo reaches the blastocyst stage that it is ready to be implanted into a womb. So since none of the three embryos in the ACT experiment survived to the blastocyst stage, some think that this shows that human NT cloning cannot be accomplished. I think it's only a matter of time before the critics are proven wrong about this.

Assuming that NT cloning will eventually be successfully used on humans, we need to be prepared to discuss the legal consequences, including the constitutional consequences. As an initial matter, we need to consider whether children conceived by cloning would be considered "human." They are conceived by a new, unusual means of reproduction. But should this make a difference in how we characterize them? Would we consider them somehow subhuman because they were conceived using NT cloning? I don't think we would, or should. Although there was a tremendous amount of opposition to IVF in the late 70s when the first "test tube baby," Louise Brown, was born, no one seriously doubted that Louise Brown (or those that followed her) was fully human. Likewise, we don't say that babies conceived by other assisted reproductive technologies such as artificial insemination, GIFT, or ZIFT, are less than human. If your parents used a weird sexual position to conceive you, we don't hold that against you—you're still fully human, without regard to what we think about the manner of your conception. So we haven't, as a society, seen fit to start making distinctions, or categories, of humans, based on the manner of their conception. This is a good thing. And I think it clearly suggests that children conceived by cloning would be fully human. Even the most vehement critics of NT cloning on humans concede that babies conceived by cloning would be human. They just feel sorry for them and argue that they should never be born.

But if you accept that individuals created by cloning are "human," a number of legal consequences automatically follow. The most common science fiction scenarios could not occur under the current legal framework. For example, a child

created by cloning could not serve as a source of spare organs for another. Current statutes prohibiting battery and murder would apply. If you yanked someone's kidney out without his or her consent, it's a battery. If you yanked their heart out, it'd be murder. Even if you passed a law saying that the battery and murder statutes did not apply when you removed organs from people conceived by cloning, such a statute would surely be invalidated on due process grounds. You may recall the famous Supreme Court case of *Rochin v. California*,[2] decided in 1952, where the Court held that due process is offended by the removal of items from the body if such removal "shocks the conscience."[3] Specifically, the *Rochin* Court found that it shocked the conscience to permit the pumping of the stomach of an individual suspected of swallowing morphine capsules.[4] I would suggest to you that if pumping someone's stomach shocks the conscience, removing their kidney or heart would, too.

Another legal issue that has been raised is the Thirteenth Amendment. Some have suggested that cloning itself enslaves those who are conceived that way. They argue that Congress should be able to use its power under the Thirteenth Amendment's Enabling Clause to ban human cloning to prevent this kind of human enslavement. First of all, the idea that a person conceived by cloning lacks free will or personal autonomy because they share DNA with the person who donated the adult cell for NT is genetic reductionism at its worst. It just gives far too much weight to the role of genetics in personality and individuality. It also fails to acknowledge that twins or other multiples are unique individuals, despite their shared genome.

The Thirteenth Amendment doesn't just prohibit involuntary servitude in a self-executing way; it also has an Enabling Clause that allows Congress to pass laws to eliminate the "badges and incidents" of slavery.[5] This term, "badges and incidents," has been interpreted by the courts to mean that Congress may pass laws aimed at removing a stamp of inferiority based on race.[6] Would a law banning human cloning be a law that removes a stamp of inferiority based on race? It's unlikely. First of all, individuals conceived by

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[2] 342 U.S. 165 (1952).

[3] *Id.* at 172.

[4] *Id.*

[5] *See* Jones v. Alfred H. Mayer Co., 392 U.S. 409, 439-40 (1968).

[6] *Id.* at 443, n.78; *see also id.* at 445-48 (Douglas, J., concurring).

cloning would not constitute a separate "race," as that term is currently understood. They would not be a distinct ethnic group bound by a common history, nationality, or geographic distribution. Each person conceived by cloning would be born in a different time, in a different place, and in a different family with unique traditions. Moreover, a ban on human cloning would not likely be based upon a desire to eliminate a stamp of inferiority. More likely, a ban would be based on the perceived social and ethical implications of cloning, not out of any fear that individuals conceived by cloning would be inferior. If anything, the common perception is that individuals conceived by cloning would be somehow superior, not inferior—that cloning would be used eugenically to perpetuate superior genomes. Besides, it makes little sense to suggest that Congress could, through banning human cloning, eliminate some perceived stamp of inferiority. That's tantamount to saying that you can eliminate a perceived stamp of inferiority by prohibiting individuals from being born at all. Surely we wouldn't allow Congress, for example, to pass a law (pursuant to the Enabling Clause) that would have banned reproduction by freed slaves, on the rationale that doing so prevents those unborn children from suffering through a life with a stamp of inferiority?

The First Amendment would likewise be implicated in any attempted ban on human cloning. It is undoubtedly permissible for Congress to ban certain types of research funded with federal dollars. Congress has done this kind of thing before with fetal tissue and stem cell research. The constitutional spending power permits this sort of ban on the use of federal dollars. But it's a whole different matter for Congress to try to ban research using private dollars because it's no longer a matter of exercising the spending power, but a matter of deciding whether the law enacted violates the First Amendment.

The Supreme Court said, in the famous obscenity case, *Miller v. California*,[7] that the First Amendment protects those communications with "serious literary, artistic, or scientific value."[8] Does anyone doubt that writings or thoughts regarding human cloning have serious scientific value? I don't think so. But, of course, Congress wouldn't pass a law just banning writings or thought on human cloning. It would ban

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[7] 413 U.S. 24 (1973).

[8] *Id.* at 24.

action—i.e., actual attempts to engage in human cloning. And the First Amendment doesn't just protect against thought police; it protects expressive action, such as burning of a flag or a draft card, or wearing armbands in protest of the war. So the question becomes whether attempts at human cloning would be expressive action. And the key to this question is whether the action is intended to be communicative by the speaker. So we'd have to decide whether the scientist who attempted human cloning would be intending to communicate something.

I think it clear that, by attempting human cloning, a scientist would be engaging in expressive conduct. When it comes to science, a scientist doesn't just want to think or write about a hypothesis, she wants to test it, to engage in experimentation to see if the idea works. A scientist who attempted human cloning would clearly be trying to communicate to the world that human cloning was not only possible, but also normatively desirable, at least in certain instances. This communicative element is inherent in experimentation of any kind. The scientist testing her hypothesis is no different from the painter who expresses himself not by thinking about painting, but by actually painting it, or the singer who expresses himself not by thinking of the tune, but by singing it. They are all expressing their creative abilities in meaningful ways that are understood by the audience that views their actions. You shouldn't be able to ban scientific experimentation (absent a compelling governmental interest and narrow tailoring) any more than you could ban the painting of a picture or the singing of a song.

Beyond the First and Thirteenth Amendments, however, is a more intriguing question: whether the Due Process Clause of the Fifth or Fourteenth Amendments would prohibit Congress from banning human cloning. Specifically, would cloning be considered to be within the ambit of the right to reproduce? This right clearly exists, not only in a negative sense (i.e., the right not to have children by using contraceptives or having a pre-viability abortion), but also in a positive sense (i.e., the right to have biologically related children of one's own). In 1942, the Supreme Court, in a case called *Skinner v. Oklahoma*,[9] invalidated an Oklahoma statute that mandated sterilization for felons convicted of repeated crimes of moral turpitude. The Court invoked strict scrutiny to invalidate the law on equal

[9] 316 U.S. 535 (1942).

protection grounds, stating that the law violated "one of the basic civil rights of man" and that "marriage and procreation are fundamental to the very existence and survival of the human race."[10] More recently, the Court in *Planned Parenthood of Southeastern Pennsylvania v. Casey*[11] stated:

> Our law affords constitutional protection to decisions relating to marriage, procreation, contraception, family relationships, child rearing, and education. . . . These matters, involving the most intimate and personal choices a person may make in a lifetime, choices central to personal dignity and autonomy, are central to the liberty protected by the Fourteenth Amendment. At the heart of liberty is the right to define one's own concept of existence, of meaning, of the universe, and of the mystery of human life. Beliefs about these matters could not define the attributes of personhood were they formed under compulsion of the state.[12]

So it seems quite clear that individuals have a right, under the Due Process Clause, to bear and beget offspring, at least via old-fashioned sexual intercourse. But what about reproduction by non-coital means? In other words, does the right to reproduce include the right to use assisted reproductive technologies to have a child? This is not an easy question to answer because the government (whether state or federal) has rarely acted to prevent reproduction, much less reproduction by assisted reproductive technologies. Even though there was fierce theological and ethical objections voiced to the use of artificial insemination and in vitro fertilization (IVF) in the beginning, there were no laws passed to ban reproduction using these technologies. So there is not a lot of case law that can help answer this question. But the limited case law that does exist uniformly holds that the use of assisted reproductive technologies are included within the ambit of the right to reproduce.

There are several cases I'd like to bring to your attention. The first is the famous "Baby M" case decided by the New Jersey Supreme Court back in 1988.[13] You may recall that, in this case, William Stern and Mary Beth Whitehead entered into a surrogacy contract whereby Whitehead agreed to be artificially inseminated with the sperm of Stern. Whitehead agreed to carry the baby to term and relinquish the baby after birth to Stern and his wife. After Baby M was born, Whitehead

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[10] *Id.* at 541.
[11] 505 U.S. 833 (1992).
[12] *Id.* at 851.
[13] 537A.2d 1227 (N.J. 1988).

refused to turn the baby over. Stern then filed suit seeking custody of the baby. Stern's argument was that, as the biological father of the child, his right to reproduce was being infringed by being denied custody of his own child. The New Jersey Supreme Court agreed that Stern had a constitutional right to reproduce and that this right included the right to use artificial insemination.[14] The court went on to conclude that Stern's right to reproduce had not been infringed because Baby M had already been born.[15] The right to reproduce did not include the right to custody of the child.[16] They were two different rights. But clearly the court agreed that an individual has a right to use artificial insemination to create a biologically related child.

Another important case is *Lifchez v. Hartigan*,[17] decided by the District Court for the Northern District of Illinois in 1990. In this case a physician brought a class action on behalf of all physicians specializing in reproductive endocrinology and fertility counseling. He sought to have a state statute prohibiting experimentation on fetuses declared unconstitutional on grounds that it was vague and violated a woman's right to reproductive privacy. The physician was specifically worried about whether the statute in question would criminalize certain aspects of IVF, such as genetic screening of the embryos, the hormonal induction of ovulation, and embryo transfer. The district court agreed with the physician and invalidated the statute, stating that "[i]t takes no great leap of logic to see that within the cluster of constitutionally protected choices that includes the right to have access to contraceptives, there must be included within that cluster the right to submit to a medical procedure that may bring about, rather than prevent, pregnancy."[18]

More recently, the Ninth Circuit decided a remarkable case. The panel has granted a petition for rehearing in the case, so we don't yet know what the court will ultimately hold, but

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[14] *Id.* at 1253 ("The right to procreate very simply is the right to have natural children, whether through sexual intercourse or artificial insemination.").

[15] *Id.* at 1253.

[16] *Id.* at 1254 ("There is nothing in our culture or society that even begins to suggest a fundamental right on the part of the father to the custody of the child as part of his right to procreate when opposed by the claim of the mother to the same child.").

[17] 735 F. Supp. 1361 (N.D. Ill.), *aff'd without opinion, sub nom.*, Scholberg v. Lifchez, 914 F.2d 260 (7th Cir. 1990).

[18] *Id.* at 1377.

the original decision is fascinating. In *Gerber v. Hickman*,[19] a state prisoner brought a Section 1983 claim against the prison, alleging that his right to reproduce was violated by the prison's refusal to allow him to mail a semen specimen to a laboratory for use in artificially inseminating his wife. The original Ninth Circuit panel ruled that the district court erred in granting a 12(b)(6) dismissal of the prisoner's claim because, if the prisoner's allegations were taken as true, they did state a cognizable claim of constitutional deprivation. So clearly the rationale of this decision supports the idea that, within the ambit of the right to reproduce, an individual—even a prisoner—has the right to use assisted reproductive technologies such as artificial insemination.

All of these cases, of course, deal with whether one has a constitutional right to use sexual assisted reproductive technologies—i.e., those technologies that create a baby in a non-coital way, but still requiring the unification of sperm and egg. Cloning, of course, is not a sexual means of reproducing; it is asexual. It does not require the unification of sperm and egg. It does require the use of an egg, but it does not require the use of sperm. But cloning is not the only type of asexual reproduction. Parthenogenesis, or "virgin birth," is also asexual. The egg begins spontaneously dividing as if fertilized by a sperm. Parthenogenesis occurs naturally in several species, including drone bees, poultry, mice, golden hamsters, and marine invertebrates. There have been no documented cases of parthenogenesis in human beings, but some scientists speculate that it could, in theory, account for one out of every one to two million human births.

Non-natural (or induced) parthenogenesis is also possible. In other words, it is possible to stimulate an egg with a combination of chemicals to coax it into dividing as though it had been fertilized. This is not just science fiction; it is now reality. In late November 2001, ACT reported that it had successfully induced parthenogenesis in human eggs stimulated by chemicals. Specifically, twenty-two human eggs were taken from donors. The eggs were soaked in a chemical solution. After five days, six out of the twenty-two (thirty percent) had divided to the point of forming blastomeres. They were then destroyed. So parthenogenesis is clearly possible for humans and presents the same kinds of issues raised by NT cloning.

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[19] 264 F.3d 882 (9th Cir. 2001), *reh'g granted*, 2001 U.S. App. LEXIS 25920 (9th Cir. Dec. 4, 2001).

If the constitutional right to reproduce includes the right to use assisted reproductive technologies such as artificial insemination and IVF, I don't see any strong logical reason why it should not also include the right to use asexual assisted reproductive technologies such as cloning and parthenogenesis. The right to reproduce does not protect a particular means of reproduction, it protects the ends—the right to bear or beget a biologically related child. Once we move beyond sexual intercourse as the means of procreation, all non-coital means (whether sexual or asexual) are essentially the same: an egg is somehow stimulated to begin the process of cell division. With sexual non-coital means, the stimulation is, of course, achieved with a sperm. With asexual non-coital means, however, the stimulation is achieved without a sperm, by the use of electricity (as with NT cloning) or chemical stimulation (as with parthenogenesis). I don't see any evidence or logic that would support the proposition that the right to reproduce includes only the right to reproduce using a sperm. Although most people would clearly prefer to reproduce the old-fashioned way (i.e., intercourse), this is not possible for many couples who wish to have a biologically related child. And for those who cannot reproduce by intercourse, no doubt the vast majority would prefer to use an assisted reproductive technology that uses both a sperm and an egg, if possible. But there are still countless thousands for whom the use of sperm and egg will not be possible and who still desire to have a biologically related child. For these individuals, NT cloning and parthenogenesis offer real hope.

If the right to reproduce includes the right to use sexual and asexual assisted reproductive technologies to have a child, the final question we must ask ourselves, from a legal standpoint, is whether the government has sufficiently compelling interests to prevent individuals from reproducing this way. The opponents of NT cloning, for example, have stated that it should be banned because it poses risks to the traditional marriage and family structures and demeans personal autonomy or individuality. Opponents also argue that a ban is necessary to protect the health and safety of the unborn and to protect genetic diversity. The first two objections to NT cloning—protecting marriage/family and denial of personal autonomy—can be quickly dismissed because they are, quite simply, based upon nothing more than mere speculation. There is absolutely no evidence that allowing NT transfer for reproductive purposes would undermine marriage or families.

To the extent that these institutions are perceived as being vulnerable today, I would suggest that this vulnerability is due to many, many factors, and that the availability of NT cloning would have little additional negative effect, if any. With regard to the autonomy/individuality argument, again, this is based on personal perception and speculation, not any objective information. And, as I stated before, it is genetic reductionism at its worst.

The objections relating to NT cloning's impact on genetic diversity can also be quickly dismissed, although at least this objection is based in something other than subjective moral beliefs about family, marriage, or individuality. The fear here is that, if NT cloning (and presumably parthenogenesis) becomes available, the human race will become, over time, less genetically diverse, and we'd be vulnerable to black plagues and the like. If we all have closely related genetic structures, one bad bug to which we're all susceptible could wipe us out. This may indeed be a realistic fear with regard to genetically engineered crops or livestock. But there is no evidence that, if NT cloning became available, that it would become the preferred method of reproduction. For every yuppie that decided he/she wanted to clone him/herself, there would be literally millions of couples who would prefer to reproduce the old-fashioned way. The likely cost of NT cloning will clearly be an impediment to most people. But beyond cost, NT cloning is likely to be attractive mostly to those individuals who cannot have a biologically related child in any other way. This is clearly not a risk to our genetic diversity, any more than are twins or other multiples.

The final asserted governmental interest in banning NT cloning is that a ban is needed to protect the health and safety of the unborn. Specifically, opponents of cloning point to the Dolly experiments to support their argument that NT cloning is simply too risky to permit its use on human embryos. These people will tell you that only one out of 277 of the lamb embryos created in the Dolly experiments lived. The implication, of course, is that 276 baby lambs had to die in order to create one Dolly. This is simply not true. The truth is that of the 277 successful egg-cell fusions, only twenty-nine began the process of cell division. This means that only twenty-nine lamb embryos were created in the first place. And of these twenty-nine lamb embryos created, they were implanted into thirteen surrogate mom ewes. Of the thirteen pregnancies attempted, only one baby lamb was born (Dolly).

So the more correct figure is that one out of thirteen attempted pregnancies resulted in a live birth. And one out of thirteen is not that bad. It's not that much different, for example, from the success rate associated with IVF.

There has also been some talk that NT cloning poses a risk of unusually large offspring. The specter here is that big, malformed human babies would be born if we allowed NT cloning to occur with humans. There has been some evidence of this phenomenon in the cattle that have been cloned. But it has not happened in other species. It is now believed that the large offspring is due to a gene unique to cattle, so it could not happen in other species. And the problem appears to be linked to the manner in which the NT was accomplished. NT is a delicate procedure that requires a delicate touch. But with the right procedures and genetic screening this problem should be avoidable in cattle and should not exist at all with other species.

The talk about so-called waste embryos that would be created and either discarded or miscarried during attempts at NT cloning in humans is likewise misleading. First of all, it's important to realize that no manner of reproduction is foolproof. About forty percent of the times that a human embryo is created by sexual intercourse, the embryo is spontaneously aborted. Most of the time, the embryo never even implants into the womb, usually due to a genetic defect in the embryo. It's nature's way of helping to ensure that only the strong survive. And, of course, there are always the times when a human baby conceived by sexual intercourse has a serious disease, condition, or deformity. Let's face it: there are tremendous risks inherent in procreating by sexual intercourse. It's not an error-free enterprise.

And we've already accepted, as a society, that there will be even larger failure rates associated with assisted reproductive technologies which are, by their nature, a higher risk enterprise. The "take home baby rate" of IVF, for example, is only about 10-30 percent, depending on which clinic and which physician is doing the procedure. In the vast majority of IVF attempts, the embryo created in the petri dish fails to thrive and is either absorbed or spontaneously aborted. Moreover, there are literally thousands of human embryos created by IVF that are discarded or frozen indefinitely. The problem got so bad in England that in 1990, the British Parliament passed a law mandating the destruction of some 3,000 frozen embryos

created by IVF.[20] So the problem of waste embryos is not a new problem posed by NT cloning. If we can accept that existing assisted reproductive technologies inevitably present a high likelihood of miscarriage, spontaneous abortion or stillbirth, can we fairly characterize this problem as providing the "compelling government interest" sufficient to justify a total ban on reproductive NT cloning? I don't think so.

Even if you do not agree with me on this, there is still another constitutional hurdle that must be overcome by those who would impose a total ban on human NT cloning. Specifically, even if the health/safety issue is accepted as a sufficiently compelling governmental interest, a ban on human cloning must also be narrowly tailored to further that interest. I would suggest that a total ban on reproductive NT cloning is not narrowly tailored. If health/safety is the compelling interest that motivates us to ban human reproductive cloning, are there not more narrowly tailored means that could further this interest? Couldn't Congress, for example, pass a law that would impose standards on the personnel and procedures employed in NT cloning? It could specify how the procedure would be done and by whom. In this way, it could ensure that the procedure, while not risk-free, was as safe as it could be. And the women who agreed to serve as egg donors and surrogate moms would, presumably, be provided with the requisite informed consent (just like they are for any other risky medical procedure). In this manner, Congress could accommodate those who fear that the procedure is too risky, yet also accommodate those who are willing to take the risk in return for the chance of having a child of their own.

The bottom line, it seems to me, is that NT cloning (and parthenogenesis) is just another way to have a baby. It may be novel, it may present some risks, but these risks are inherent in all kinds of reproduction and the payoff, for those wanting a child, is potentially very big. The right to reproduce should not be limited by the manner of reproduction chosen. If the goal is to have, love, and raise a child of one's own, the means chosen to achieve that goal should not matter. If the much uttered phrase, "family values," means anything, shouldn't it mean this?

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[20] *See* Elizabeth Price Foley, *The Constitutional Implications of Human Cloning*, 42 ARIZ. L. REV. 647, 672-73 (2000).